

REMARKS

By the present amendment, claims 1 and 17 have been amended to obviate the examiner's objections thereto and/or to further clarify the concepts of the present invention. It is submitted that these amendments to the claims are helpful in distinguishing the subject claims over the cited prior art and do not raise new issues which would require further consideration and/or search. In addition, it is submitted that such amendments place the application in better form for appeal by materially reducing or simplifying the issues for appeal. Furthermore, no additional claims are presented without cancelling a corresponding number of finally rejected claims. In view of the above, it is submitted that entry of the above amendments is in order and such is respectfully requested.

In the Office Action, claims 1-17 were rejected under the first paragraph of 35 U.S.C. §112. Specifically, it was asserted that (1) the claims contain subject matter in terms of hardness values cannot be interpreted since there is no recitation of a scale or unit for the hardness values. In addition, it was asserted that (2) a chart which was submitted with a previous response and which compared hardness values on various scales was suspect and clarification was necessary. Reconsideration of the rejection in view of the above claim amendments and the following comments is respectfully requested.

In response to (1), the two independent claims have been amended to recite "a

hardness of 40 to 67 as measured with a load of 9.8 N by means of a durometer of Type A in accordance with Japanese Industrial Standard K 6253." Thus, it is submitted that there is now a recitation of a scale or unit for the hardness values. As to (2), it is acknowledged that the previously submitted chart contains an error. Specifically, the terms "harder" and "softer" at the bottom of the chart are reversed. With these labels properly reversed, the chart shows that as hardness values such as JIS A and Shore A increase, the polymer becomes "harder" and as these hardness values decrease, the polymer becomes "softer." Accordingly, withdrawal of the rejection under the first paragraph of 35 U.S.C. §112 is respectfully requested.

Claims 1 and 3 were rejected under 35 U.S.C. §102(b) as being anticipated by the patent to Werner. In addition, claim 1 was rejected under 35 U.S.C. §102(b) as being anticipated by the '040 British patent. In making these rejections, it was asserted that each of the patents teaches a polyurethane composition formed of the components as claimed. It further was asserted that the properties as recited in the claim were presumed to be inherently met by the composition as disclosed in the patents. Reconsideration of these rejections in view of the above claim amendments and the following comments is respectfully requested.

Before discussing the rejection in detail, a brief review of the presently claimed invention may be quite instructive. The presently claimed invention relates to, in one aspect, a urethane composition for preparing a sheet transport roll for use in a copying

machine, the composition comprising: (A) a specific polyether polyol blend; (B) a polyisocyanate; and (C) a chain lengthening agent, the urethane composition in a cured state having specific hardness, and a specific crosslinking density or a specific allophanate bond concentration. It is submitted that such a urethane composition for preparing a sheet transport roll for use in a copying machine is not taught or suggested by the cited patent to Werner or by the cited British patent.

More particularly, it is submitted that the two cited patents do not teach, among other things, a urethane composition for preparing a sheet transport roll for use in a copying machine, the composition in a cured state being within a specific hardness range. Specifically, since the urethane composition according to the Werner patent is used as sidewalls of pneumatic tires, the hardness of the urethane composition in a cured state is higher than that of the present invention. In addition, since the urethane composition according to the British patent is used as gaskets and solid tyres, the hardness of the urethane composition in a cured state is higher than that of the present invention. Specifically, the hardness of the urethane composition in a cured state according to the Examples in the Werner patent is 90 to 96. In addition, the hardness of a urethane composition in a cured state according to the Examples in the British patent is 68 to 78.

As mentioned above, the presently claimed invention relates to a urethane composition for preparing a sheet transport roll for use in a copying machine. The maximum hardness of the urethane composition in a cured state according to the present

invention is 67 and this hardness is lower than those of the Werner and British patents. If a urethane composition having a hardness of greater than 67 is used as a sheet transport roll for use in a copying machine, the resulting roll tends to have a narrow nip width and a low friction coefficient. Therefore, the sheet transport roll will have poor transportation ability after a durability test, because the hardness is extremely high. There is no teaching or suggestion in the Werner or British patents about such a characteristic structure and a peculiar effect as described in the present application.

In addition, the presently claimed invention has a characteristic structure that the urethane composition in a cured state for preparing a sheet transport roll for use in a copying machine has a crosslinking density of 0.15 to 0.8 mmol/cm³ or an allophanate bond concentration of 0.03 to 0.07 mmol/g. If the crosslinking density is smaller than 0.15 mmol/cm³, the abrasion resistance and compression resistance of the resulting roll tend to deteriorate. If the crosslinking density is greater than 0.8 mmol/cm³, the resulting roll tends not to have a high friction coefficient because of its high hardness. If the allophanate bond concentration is smaller than 0.03 mmol/g, the resulting roll tends to have a reduced abrasion resistance. If the allophanate bond concentration is greater than 0.07 mmol/g, the resulting roll tends not to have a high friction coefficient because of its high hardness. It is submitted that there is no teaching or suggestion in the Werner or British patents concerning such a characteristic structure and a particular effect as described in the present application.

For the reasons stated above, withdrawal of the rejections under 35 U.S.C. §102(b) and allowance of claims 1 and 3 over the cited Werner and British patents are respectfully requested.

Claims 2 and 4-17 were rejected under 35 U.S.C. §103(a) as being unpatentable over the '192 Japanese patent publication in view of the '237 European patent publication and either of the above British patent or the Werner patent. In making this rejection, it was asserted that the Japanese patent publication teaches a sheet transporting roller made of polyurethane. Although it was acknowledged that the Japanese patent publication does not teach the composition of the polyurethane, it was asserted that it would be obvious to use the polyurethane as disclosed in either the British patent and the Werner patent. The European patent publication was cited for teaching the recited additives. Reconsideration of this rejection in view of the above claim amendments and the following comments is respectfully requested.

The Japanese patent publication discloses that in a polyurethane roller for use in a sheet feeding part or the like of office automation equipment, the hardness of the roller is JIS-A 40 to 70. However, polyesterpolyol (KURAPOL2010 available from Kuraray Co., Ltd. and having an average molecular weight of 2000) is used in Examples of the Japanese publication. The polyesterpolyol fails to provide favorable results if they are used as the urethane composition for preparing a sheet transport roll in a copying machine, because the polyesterpolyols are poor in hydrolysis resistance since ester bonds in their

molecular structure are liable to be hydrolyzed due to water or the like.

In distinct contrast, the presently claimed invention has a characteristic structure that the weight ratio between polytetramethyleneether glycol (PTMG) and polypropylene glycol (PPG) is in the range of PTMG/PPG=99/1 to 50/50. If the weight ratio of PPG is smaller than 1, it generally is not possible to provide a high friction coefficient. If the weight ratio of PPG is greater than 50, the abrasion resistance tends to be deteriorated.

There is no teaching or suggestion in the cited Japanese publication concerning such a characteristic structure and the particular effect as described in the present application. In addition, as described above, there is no teaching or suggestion in the Japanese publication that a crosslinking density or an allophanate bond concentration of the urethane composition for preparing a sheet transport roll for use in a copying machine is within a specific range as recited in the subject claims.

As set forth above, the Werner patent relates to a urethane composition for use as sidewalls of pneumatic tires and the British patent relates to a urethane composition for use as gaskets and solid tyres. Thus, a urethane composition for preparing a sheet transport roll for use in a copying machine according to the present invention is obviously different from those of the Werner and British patents with regard to their particular utility and thus technical fields. Therefore, it would not be apparent for one skilled in the art to combine the teachings of the Werner and British patents with the teachings of the

Japanese publication which relates to a polyurethane roll because the Japanese publication falls within a technical field having no relation to the subject matter of the Werner and British patents. Thus, these publications provide no suggestion to motivate one of ordinary skill in the art to combine their teachings in the manner proposed.

The above basic argument as to no motivation to combine as made in the last response was responded to in the Action by basically asserting that both the British patent and the Werner patent teach the use of the compositions for friction applications and thus it would be obvious to use the compositions in sheet transport roll since this application is also a friction application. It is submitted that such an assertion is unsupported as gaskets according to the British patent and sidewalls of pneumatic tires according to the Werner patent are not considered to be friction applications.

Even if the teachings of the Werner and the British patents were combined with the teachings of the Japanese publication, the presently claimed invention would not be attained since the hardness of the urethane composition in a cured state and a crosslinking density or an allophanate bond concentration are set to the respective optimum values for the urethane composition for preparing a sheet transport roll for use in a copying machine. Among other things, there is no teaching or suggestion in any of the cited patents about a characteristic structure and a peculiar effect that a crosslinking density or an allophanate bond concentration of the urethane composition in a cured state for preparing a sheet transport roll for use in a copying machine is in the aforesaid specific ranges.

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For the reasons stated above, withdrawal of the rejection under 35 U.S.C. §103(a) and allowance of claims 2 and 4 through 17 over the cited patent publications are respectfully requested.

In view of the foregoing, it is submitted that the subject application is now in condition for allowance and early notice to that effect is earnestly solicited.

In the event this paper is not timely filed, the undersigned hereby petitions for an appropriate extension of time. The fee for this extension may be charged to Deposit Account No. 01-2340, along with any other additional fees which may be required with respect to this paper.

Respectfully submitted,

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Enclosure: Marked Up Version of Amendments To Claims and Specification

Marked Up Version of Amendments to Claims and Specification

IN THE CLAIMS:

Amend the claims as follows:

1. (Thrice Amended) A urethane composition for preparing a sheet transport roll for use in a copying machine, the composition comprising: (A) a polyether polyol blend containing polytetramethyleneether glycol (PTMG) and polypropylene glycol (PPG) in a weight ratio of PTMG/PPG = 99/1 to 50/50; (B) a polyisocyanate; and (C) a chain lengthening agent, the urethane composition in a cured state having a hardness of not smaller than 40 to 67 as measured with a load of 9.8 N by means of a durometer of Type A in accordance with Japanese Industrial Standard K 6253, and a crosslinking density of 0.15 to 0.8 mmol/cm³ or an allophanate bond concentration of 0.03 to 0.07 mmol/g.

17. (Thrice Amended) A sheet transport roll for use in a copying machine comprising: a shaft; and a urethane layer provided on an outer periphery of the shaft, the urethane layer being composed of a urethane composition in a cured state prepared from: (A) a polyether polyol blend containing polytetramethyleneether glycol (PTMG) and polypropylene glycol (PPG) in a weight ratio of PTMG/PPG = 99/1 to 50/50; (B) a polyisocyanate; and (C) a chain lengthening agent; the urethane composition in a cured state having a hardness of not smaller than 40 to 67 as measured with a load of 9.8 N by means of a durometer of Type A in accordance with Japanese Industrial Standard K 6253, and a crosslinking density of 0.15 to 0.8 mmol/cm³ or an allophanate bond concentration of 0.03 to 0.07 mmol/g.